THE VARIATION OF THE INTENSITY OF GRAVITY AT DIFFERENT POINTS OF THE EARTH'S SURFACE.

Commandant DEFFORGES, of the geographical service of the French army, has been engaged since 1884 in making pendulum determinations of the intensity of gravity at different points of western Europe and northern Africa. His work comprises forty-one determinations at thirty-five different stations. He has recently been able to connect his results and those of twelve other European geodesists into one homogenous system, and to draw from them some most remarkable conclusions.

CLAIRAUT has given a formula for determining the force of gravity at any point whose latitude is given. It has long been known that at some stations the values obtained from observations are greater than those given by CLAIRAUT'S law, while at other stations they are less. These anomalies of gravity have been attributed either to corresponding anomalies in the figure of the Earth, or to the insufficiency of the formulæ for reducing to sea level, or to the unequal distribution of mass in the Earth's crust, or finally, in most cases, to the insufficiency or to the errors of observation. Commandant DEFFORGES' deductions from these anomalies are as follows*:

"From all of our measures and all of the old measures which can be united with them with safety, there result some very plain facts, henceforth incontestable, and which can be generalized. They can be stated briefly, thus:

"Gravity is distributed very unequally over the surface of the globe.

"The law of CLAIRAUT, true in general, is nearly everywhere marked by appreciable anomalies.

"Gravity, upon the shores of different seas, presents some small anomalies; constant for any given shore and consequently characteristic.

"On the islands there is considerable excess of gravity.

"On the continents the inverse is true, and the defect seems to increase proportionally to the altitude and the distance from the ocean.

"We give, by way of illustration, this table of these anomalies of gravity upon a line which starts at Spitzberg, traverses Great

* Translated from *Comptes Rendus (de l'Académie des Sciences)* for July 24, 1893.

Britain, France, the Mediterranean Sea, and ends at Biskra (in Africa):

Names of Stations.	Altitudes.*	Residuals. Obs'd-Comp'd	Names of Stations.	Altitudes.*	Residuals. Obs'd-Comp'd
	m.			m.	
Spitzberg	6	+88	Figeae	223	−60
Unst.	9	+55	Marseille	61	+14
Porstoy.	29	+52	Bastia.	20	+93
Leith.	21	+35	Corte	605	+34
Clifton.	104	+14	Ajaccio.	6	+41
Arbury Hitt . . .	225	+32	Philippville . . .	20	+41
London	25	+15	Col des Oliviers .	420	−13
Greenwich	48	0	Constantine . . .	655	−64
Shanklin Farm. . .	74	+ 7	Ouled Rhamoun .	687	−21
Dunkerque. . . .	20	+ 5	Aïn Yagout . . .	890	−90
Lihons.	106	− 3	Batna	1050	−145
Paris	60	−18	El Kantara . . .	525	−143
Lyon	286	−10	Biskra.	137	−100
Clermont.	406	−63	. . . . .	. . . .	. . . .

*The altitudes are expressed in metres, and the residuals are expressed as so many hundred-thousandths of a metre. Thus, at Biskra the observed effect of gravity in one second is an acceleration of 9.79698 and the computed is 9.79798 metres, giving the residual — 100.—[TRANSLATOR.]

"The residuals (anomalies), positive in Spitzberg, Scotland and Corsica, become negative on the French and Algerian continents. The residuals on the continents increase with the altitude and the distance from the sea.

"It must be noticed also that from Shetland to the Mediterranean, the real surface of the ellipsoid does not differ at any point, according to CLARKE, from the theoretical surface by more than 6.4 metres. We cannot, therefore, attribute the anomalies in gravity to anomalies in the figure of the Earth.

"It is from geology that we must ask an explanation of these irregularities.

"The English measures in India, connected with ours at Kew and Greenwich, furnish a splendid confirmation of the laws determined in Europe and Africa, in Great Britain, France and Algiers."

These results derive their great interest from the fact that they are precisely the reverse of what would naturally be expected. If the intensity were *less* on small islands and on seashores than in the interiors of continents no comment would be called for, since the density of water is very much less than that of the Earth's crust.

Commandant DEFFORGES determined the intensity of gravity on Mt. Hamilton, in October, 1893. He uses a "reversible invertable" pendulum invented and manufactured by himself, by which it is claimed that many errors hitherto very troublesome have been wholly eliminated, and that the results for relative gravity are certainly correct within one part in one hundred thousand. W. W. C.

THE NEW NOTATION FOR THE HYDROGEN LINES.

A rational system of notation is at last to be given to the fourteen lines in the hydrogen spectrum. Heretofore, three incomplete systems have been used. Professor VOGEL has now suggested (in *Astronomische Nachrichten*, No. 3198) a simple nomenclature which will undoubtedly be employed hereafter by all spectroscopists. The new and old nomenclatures are given in the second and third columns of the following table. The first column contains the approximate wave-lengths of the lines, in tenth-metres :

Wave-Length.	New Name.	Old Name.
6563	H_α	C or H_α
4861	H_β	F or H_β
4341	H_γ	H_γ, often called G
4102	H_δ	h or H_δ
3969	H_ϵ	H or H_ι
3889	H_ζ	α
3836	H_η	β
3798	H_θ	γ
3771	H_ι	δ
3750	H_χ	ϵ
3734	H_λ	ζ
3722	H_μ	η
3712	H_υ	θ
3704	H_ξ	ι

W. W. C.